PHY102 : Classical Physics

Programme: B.Tech. (All branches) Year: 1st year Semester : 1st semester
Course : Core Course Credits : 4 Hours : 40

Course Context and Overview:

Classical mechanics: Classical mechanics can be called the first branch of Physics upon which all other branches of Physics have been built. It can describe the motion of macroscopic objects like projectiles, parts in any machinery, spacecraft etc. Thus knowledge of classical mechanics to an engineering student becomes mandatory.

Electrodynamics: The subject Electrodynamics deals with phenomena associated with one of the fundamental forces of nature (Electromagnetic force). In nature apart from Gravitational force this is the other fundamental force which affects immensely in our daily life. A basic understanding of this subject is essential for any branch of engineering.

Prerequisites Courses: None

Course outcomes(COs):

On completion of this course, the students will have the ability to:
CO1: Students will attain the basic problem solving skills in problems related to Newtonian mechanics, rotational dynamics, etc.
CO2: They would be able to apply the concepts of work and energy, linear and angular momentum in their branch of engineering.
C03: The concepts related to vector fields, vector calculus, electric field, electrical potential function. potential energy, magnetic field magnetic potential function etc.
C04: The four Maxwell's equations

Course Topics:

Topics	Lecture Hours
UNIT I: Classical Mechanics	20
1. Co-Ordinate Systems	
2. Vectors and Kinematics	
3. Newtonian Mechanics	
4. Momentum	
5. Work and Energy	

6. Collisions in Center-of-Mass Frame	
7. Angular Momentum	
8. Torque	
9. Rigid Body Motion	
10. Central Force Motion	
11. Harmonic Oscillator	
12. Non-Inertial Frame of Reference	
UNIT II: Electrodynamics	20
1. Review of Mathematical Tools	
2. Electrostatics	
3. Special techniques	
4. Concepts of Dipole, Multipole expansion	
5. Electric Field in Materials	
6. Magnetostatics	
7. Magnetic Field in Materials	
8. Electromotive Force & Electromagnetic Induction	
9. Maxwell's Equation	

Textbook references (IEEE format):
Text Books:

1. Classical mechanics: D. Kleppner & R. Kolenkow, "An Introduction to Mechanics", Tata McGraw Hill
2. Electrodynamics: D. J. Griffiths, Introduction to Electrodynamics, Prentice Hall, New Delhi, 1995.

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):

1. MIT Opencourse ware lectures on Classical Mechanics by Prof. W. Lewin
2. MIT Opencourse ware lectures on Vibrations and Waves by Prof. W. Lewin

Evaluation Methods:

Item	Weightage
Quizzes	20
Midterm	30
Final Examination	50

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